Patent Claims

1. An integrated semiconductor structure, having
- a substrate (1),
- at least one semiconductor element (2) located on the substrate (1),
- a pad metal (3) having a surface (F),
- a multiplicity of metal layers (4.x) which are located between the pad metal (3) and the substrate (1), and
- a multiplicity of insulation layers (5.y), which separate the metal layers (4.x) from one another,
- the pad metal (3) extending at least over part of the at least one semiconductor element (2),

wherein, below the surface (F) of the pad metal (3), at least the top two metal layers (4.x, 4.x-1) have a structure which in each case at least includes two adjacent interconnects (4.x.z, 4.x-1.z)

2. The integrated semiconductor structure as claimed in the preceding claim 1, wherein the number z of the interconnects (4.x.z) of a metal layer (4.x), beneath the surface (F) of the pad metal (3), is between 2 and 6.

3. The integrated semiconductor structure as claimed in one of the preceding claims 1 to 2, wherein the interconnects (4.x.z) within a metal layer (4.x) are electrically insulated from one another.

4. The integrated semiconductor structure as claimed in one of the preceding claims 1 to 3, wherein the interconnects (4.x.z) within a metal layer (4.x) are electrically connected to one another.

5. The integrated semiconductor structure as claimed in one of the preceding claims 1 to 4, wherein the interconnects (4.x.z) within a metal layer (4.x) have a width (B) and are at a spacing (A) from one another,

the ratio between the width (B) and the spacing (A) being between 3 and 20.

6. The integrated semiconductor structure as claimed in the preceding claim 5, wherein the ratio between the width (B) and the spacing (A) is 10.

7. The integrated semiconductor structure as claimed in one of the preceding claims 1 to 6, wherein, at least below the surface (F) of the pad metal (3), there is a multiplicity of vias (6) which electrically connect the interconnects (4.x.z) of the top metal layer (4.x) to the interconnects (4.x-1.z) of the metal layer (4.x-1) below it, the vias (6) penetrating through the insulation layer (5.y-1).

8. The integrated semiconductor structure as claimed in one of the preceding claims 1 to 7, wherein, at least below the surface (F) of the pad metal (3), the interconnects (4.x.z 4.x-1.z) of the top two metal layers (4.x, 4.x-1) have a multiplicity of apertures (7.x, 7.x-1).

9. The integrated semiconductor structure as claimed in the preceding claim 8, wherein, at least below the surface (F) of the pad metal (3), the apertures (7.x, 7.x-1) have a total area of between 5% and 30% of the total area of the interconnects (4.x.z, 4.x-1.z).

10. The integrated semiconductor structure as claimed in the preceding claim 9, wherein the apertures (7.x, 7.x-1) have a total area of 20% of the total area of the interconnects (4.x.z, 4.x-1.z).

11. The integrated semiconductor structure as claimed in one of the preceding claims 8 to 10, wherein the interconnects (4.x.z, 4.x-1.z) of the top two metal layers (4.x, 4.x-1) are arranged in such a manner with respect to one another that the apertures (7.x) in the

top interconnects (4.x.z) are offset with respect to the apertures (7.x-1) in the interconnects (4.x-1.z) below.

12. The integrated semiconductor structure as claimed in one of the preceding claims 8 to 11, wherein the interconnects (4.x.z) of the top metal layer (4.x) lie approximately congruently above the interconnects (4.x-1.z) of the metal layer (4.x-1) below.

13. The integrated semiconductor structure as claimed in one of the preceding claims 8 to 12, wherein the interconnects (4.x.z) of the top metal layer (4.x) are offset with respect to the interconnects (4.x-1.z) of the metal layer (4.x-1) below.

14. The integrated semiconductor structure as claimed in one of the preceding claims 1 to 13, wherein the metal layers (4.x), at least for the most part, are made from a sufficiently hard metal.

15. The integrated semiconductor structure as claimed in the preceding claim 14, wherein the metal contains aluminum, copper, tungsten, molybdenum, silver, gold, platinum or alloys thereof.

16. The integrated semiconductor structure as claimed in one of the preceding claims 1 to 15, wherein the surface (F) of the pad metal (3) covers a region which, within a metal layer (4.x), comprises at least 50% metal.

17. The integrated semiconductor structure as claimed in the preceding claim 16, wherein the metal is distributed uniformly beneath the surface (F) of the pad metal (3).

18. The integrated semiconductor structure as claimed in one of the preceding claims 1 to 17, wherein a top

insulation layer (5.y) is provided between the pad metal (3) and the top metal layer (4.x), the top insulation layer (5.y) having a first thickness (D1) and the top metal layer (4.x) having a second thickness (D2), and the ratio between the two thicknesses (D1, D2) being between 1 and 5.

19. The integrated semiconductor structure as claimed in one of the preceding claims 1 to 18, wherein a top insulation layer (5.y) is provided between the pad metal (3) and the top metal layer (4.x), the top insulation layer (5.y) having a thickness (D1) and the pad metal (3) having a further thickness (D3), and the ratio between the two thicknesses (D1, D3) being between 0.5 and 3.

20. The integrated semiconductor structure as claimed in one of the preceding claims 1 to 19, wherein the number x of the metal layers (4.x) is between 3 and 11.